

ORIGINAL ARTICLE

Three new species of *annulitibia*-group of the genus *Macrophya* Dahlbom (Hymenoptera: Tenthredinidae) in Mts. Qinling from China

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Abstract Three new species of the *annulitibia*-group of the genus *Macrophya* Dahlbom (Hymenoptera, Tenthredinidae) in Mts. Qinling from China are described, namely *M. brevicinctata* Li, Liu & Wei, **sp. nov.**, *M. qinlingium* Li, Liu & Wei, **sp. nov.** and *M. rugosifossa* Li, Liu & Wei, **sp. nov.**. A key to all known species of the *annulitibia*-group from China is provided. The specimens examined in this study are mostly deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China, including all holotypes and some paratypes of the new species. Other paratypes of the new species are deposited in the Department of Zoology, National Museum of Nature and Science, Amakubo, Tsukuba, Ibaraki, Japan.

Key words Symphyta, Tenthredinidae, *Macrophya*, taxonomy.

1 Introduction

Macrophya Dahlbom, 1835, the third largest genus of Tenthredininae (Tenthredinidae), contains 271 species worldwide (Li & Wei, 2013; Li *et al.*, 2013a, b, c, 2014a, b, 2016; Liu *et al.*, 2015a, b; Shinohara & Li, 2015; Shinohara & Yoshida 2015). In China, there are 132 species recorded under the genus *Macrophya* (Li *et al.*, 2012, 2013a, b, c, 2014a, b, 2016; Li & Wei, 2012, 2013; Liu *et al.*, 2015a, b; Taeger *et al.*, 2010; Wei *et al.*, 2006, 2013; Wu *et al.*, 2012; Zhao *et al.*, 2010; Zhao & Wei, 2011; Zhu *et al.*, 2012).

Macrophya includes 27 groups worldwide (Li *et al.*, 2014a, 2015b). The *annulitibia*-group is represented by seven species: *M. annulitibia* Takeuchi, 1933, *M. gopeshwari* Saini, Singh, Singh & Singh, 1986, *M. naga* Saini & Vasu, 1997, *M. parapompilina* Wei & Nie, 1999, *M. pompilina* Malaise, 1945, *M. shengi* Li & Chu, 2015 and *M. xinan* Li & Liu, 2015. These species are similar in general morphology and form the distinct species group.

In China, five species of *annulitibia*-group have been recorded: *M. annulitibia* Takeuchi, 1933, *M. parapompilina* Wei & Nie, 1999, *M. pompilina* Malaise, 1945, *M. shengi* Li & Chu, 2015 and *M. xinan* Li & Liu, 2015. The species *M. annulitibia* is also known from Japan, North Korea and East Siberia; *M. gopeshwari* and *M. naga* are known from India.

In this paper, three new species of *annulitibia*-group in Mts. Qinling from China are described, namely *Macrophya brevicinctata* Li, Liu & Wei, **sp. nov.**, *M. qinlingium* Li, Liu & Wei, **sp. nov.** and *M. rugosifossa* Li, Liu & Wei, **sp. nov.**,

urn:lsid:zoobank.org:pub:CDD3992A-A49F-4126-A017-25D5D2462226

Received 6 September 2015, accepted 24 March 2016

Executive editor: Fuqiang Chen

and a key to all known species from China is provided.

2 Materials and methods

The specimens were examined with a Motic-SMZ-168 stereomicroscope. Adult images were taken with a Nikon D700 digital camera and a series of images montaged using Helicon Focus (©HeliconSoft). All images were further processed with Adobe Photoshop CS 11.0®. The terminology of the general morphology follows Viitasaari (2002), the genitalia follows Ross (1945), and few terms (e.g. middle fovea and lateral fovea) follow Takeuchi (1952).

The specimens examined in this study are mostly deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China (CSCS), including all holotypes and some paratypes of the new species. Other paratypes are deposited in the Department of Zoology, National Museum of Nature and Science, Amakubo, Tsukuba, Ibaraki, Japan (NMS).

3 Taxonomy

The *annulitibia*-group

Diagnosis. Body mainly black, without metallic tinge; antenna slender, black; posterior margin of metepimeron concave to some extent, appendage differentiated, but without long hairs in basin (concave area); anal cell of hind wing without petiole; serrulae of lancet in female protruding in different degrees; valviceps in male transverse and with a platform at the top, without ergot.

Key to the known species of the *annulitibia*-group from China.

1. Fore wing with transverse smoky band below stigma more or less..... 2
Fore wing hyaline, without smoky band below stigma 4
2. Metepimeral appendage broad and large, about 3.5 times breadth of cenchrus, center of metepimeral appendage little shiny, with clear microsculptures and punctures (Fig. 27); fore wing with feeble, transverse smoky band below stigma, bound not clear (Fig. 22); hind trochanter entirely black, without white macula (Fig. 22); hind tibia and tarsi entirely blackish brown (Fig. 22); middle serrulae of lancet in female usually with 22–29 distal teeth, subbasal teeth very minute (Fig. 30). China (Gansu, Shaanxi)
..... *M. rugosifossa* sp. nov.
Metepimeral appendage smaller than the former, about 2 times breadth of cenchrus, metepimal appendage shiny, without distinct microsculpture and puncture; fore wing with distinct, transverse smoky band below stigma, bound clear; hind trochanter entirely white, if largely white, ventral side of hind trochanter with black maculae; hind tibia entirely black, hind tarsi with white maculae more or less; middle serrulae of lancet in female usually with 10–12 distal teeth, subbasal teeth small..... 3
3. Antenna partly white, antennomere 3 approximately 1.1 times as long as antennomere 4; posterior margin of metepimeron slightly extended downward and concave, appendage narrow and small; hind femur with white band dorsally. Burma, China (Sichuan, Yunnan) *M. pomilina* Malaise, 1945
Antenna entirely black, antennomere 3 approximately 1.4 times as long as antennomere 4; posterior margin of metepimeron extended downward, strongly concave, appendage wide and large; hind femur entirely black. China (Gansu, Shanxi, Henan, Hubei, Sichuan, Yunnan) *M. parapomilina* Wei & Nie, 1999
4. Hind tibia largely with reddish brown maculae at base, apex black, but without yellow macula (Fig. 1); postocellar area 2.0 times broader than long (Fig. 2); cell 2Rs as long as cell 1Rs, petiole of anal cell in the fore wing about 1.8 times longer than crossvein 1r-m and about 1.2 times longer than crossvein cu-a (Fig. 1); middle serrulae of lancet in female each with 2 proximal and 9–11 distal teeth, not protruding mastoid-like (Fig. 8). China (Shaanxi, Hubei) *M. brevicinctata* sp. nov.
Hind tibia largely black, middle part with distinct yellow ring, usually color ranged from yellowish white to yellow, but without reddish brown macula absolutely; other characters not different from the former 5
5. Pronotum entirely black in female; lateral corners of posterial margin with clear yellowish white maculae in male; middle part of hind tibia with yellowish white ring in two sex specimen, shorter than 1/2 times of hind tibia clearly 6
Lateral corners of posterial margin of pronotum with yellow maculae distinctly in female; unknown in male; hind tibia with yellow ring from subbasal to middle parts, not shorter than 1/2 times of hind tibia 7
6. Postocellar area about 2.5 times broader than long; hind tarsomere 1 entirely black. North Korea; Japan, East Siberia, China (Heilongjiang, Jilin, Liaoning, Gansu, Henan, Sichuan) *M. annulitibia* Takeuchi, 1933

- Postocellar area about 2 times broader than long (Fig. 11); hind tarsomere 1 largely pale yellowish white at apex, shortly black at base (Fig. 9). China (Liaoning, Ningxia, Gansu, Shaanxi, Henan, Hubei, Sichuan, Yunnan) *M. qinlingium* sp. nov.
7. Mesoscutellum entirely yellow; posterior margin of metepimeron clearly extended downward and concave, appendage long and narrow, containing some minute punctures; fore coxa largely yellow, with small black maculae; basal half of middle femur yellow, apical half black; basal 4/7 of hind femur yellow, apical 3/7 black; hind tarsus largely yellow, base of hind tarsomere 1 black; apical 1/7 of fore wing with a subrounded, smoky macula. China (Tibet, Sichuan) *M. xinan* Li & Liu, 2015
 Mesoscutellum entirely black; posterior margin of metepimeron extended downward and concave, appendage broad, containing some large punctures; fore coxa largely black, with small yellow maculae; basal 1/3 of middle and hind femora yellow, apical 2/3 black; hind tarsus entirely yellow; fore wing without smoky macula. China (Sichuan) *M. shengi* Li & Chu, 2015

4 Descriptions

4.1 *Macrophya brevicinctata* Li, Liu & Wei, sp. nov. (Figs 1–8)

Female. Body length 8.0–8.5 mm. Body black; following parts yellowish white: palpi, base largely of mandibles, labrum, clypeus, anterior parts of tegula, center parts of posterior margin of abdominal tergum 1, center of abdominal tergum 10, outer side of ventral side of fore coxa, apex of middle caxa, apical margin of hind coxa, an oval long macula in outer side of hind coxa, all trochanters, anterior margins of fore femur, anterior parts of middle femur, basal 1/5 of hind femur, anterior parts of fore tibia, ventral side of middle tibia, basal parts largely in ventral sides of fore and middle tarsi (except for apical margins black of all tarsomere), hind tarsomere 2–4 entirely and base of tarsomere 5; hind tibia largely with reddish brown maculae, apex with black ring maculae; hind tarsomere 1 reddish brown. Body hairs silver; setae on sheath curved, pale blackish brown. Wings hyaline, without smoky macula, stigma and veins largely blackish brown (Fig. 1).

Dorsum of head feebly shiny, frons minutely and densely punctured slightly, interspaces between punctures narrower than diameter of puncture, with fine microsculpture (Fig. 2); labrum and clypeus less shiny, with sparse and shallow punctures; temple with small smooth areas, with some punctures and fine microsculpture (Fig. 3). Pronotum and mesonotum with punctures smaller and denser than punctures on head, interspaces with fine microsculpture; mesoscutellum not shiny, with minute punctures, round parts with some large and shallow punctures, microsculpture less rugose; mesoscutellar appendage with distinct microsculpture; metascutellum with some large and shallow punctures. Mesepisternum densely and shallowly punctured, interspaces with fine microsculpture; anepimeron rugosely punctured and wrinkled; anterior margin 1/4 of katepimeron strongly shiny, without puncture or microsculpture, posterior parts 3/4 of katepimeron with some shallow punctures and microsculpture; metepisternum with fine punctures and microsculpture; metepimeron less shiny, most parts with shallow and small punctures, upper corner of dorsal margin with coarse punctures; posterior margin of metepimeron extended downward and concave, appendage containing some shallow punctures and fine microsculptures (Fig. 5). All abdominal terga feebly shiny, lateral sides of tergum 1 with some fine punctures, center nearly smooth; base of other abdominal terga with sparse and shallow punctures, microsculpture fine but distinct. Hind coxa and outer side of hind femur with minute and dense punctures, smooth interspaces narrow, feebly shiny. Surface of sheath coriaceous, with very fine punctures and microsculpture.

Middle of labrum weakly elevated, anterior margin truncate; clypeus weakly elevated, about 2 times broader than long, base broader than distance between lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin incised to approximately 1/3 length of clypeus, lateral lobes obtuse, subtriangular-like (Fig. 3); malar space 0.5 times as long as diameter of middle ocellus; middle of frons flat, about as high as top of eyes in lateral view; middle fovea shallow but distinct; lateral foveae small, short furrow-like; interocellar furrow distinct, postocellar furrow indistinct; POL:OOL:OCL = 3:12:8; postocellar area elevated, posterior margins oblique, 2 times broader than long, lateral furrows shallow and clearly divergent backwards; head strongly narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.5 times longer than head and thorax together (3:2), 1.2 times as long as abdomen (21:17); antennomere 2, 1.3 times as long as broad, antennomere 3, 1.4 times as long as antennomere 4 (11:8), 0.7 times as long as antennomeres 4 and 5 combined (22:31), subapical antennomeres weakly compressed, not inflated, subapical antennomeres 6 to 9 not reduced (Fig. 4). Mesoscutellum roundly elevated, with low peak and middle carina, posterior margins without lateral carina, slightly higher than top of mesoscutum; mesoscutellar appendage with distinct middle carina; metascutellum with low and short middle carina, mesopleuron and metapleuron as in Fig. 5; dorsal-posterior platform of mesepimeron as broad as diameter of middle ocellus; distance between cenchri 2 times breadth of cenchrus. Inner tibial spur of hind leg 0.7 times length of hind tarsomere 1 (30:43); hind tarsomere 1 slender, as long as following 4 tarsomeres together; claw with

inner tooth shorter than outer tooth. Ovipositor sheath slightly shorter than hind tarsomere 1 (31:43), apical sheath slightly longer than basal sheath (19:12), apical margin roundish in lateral view (Fig. 6). Fore wing with crossvein 1cu-a joining cell 1M at basal 1/3, crossvein 2r-rs joining cell 2Rs at apical 3/8, cell 2Rs as long as cell 1Rs; petiole of anal cell in fore wing about 1.8 times longer than crossvein 2r-m and about 1.2 times longer than crossvein 1cu-a; anal cell of hind wing without petiole. Lancet with 19 serrulae (Fig. 7), middle serrulae protruding subtriangular-like and each with 2 proximal and 9–11 distal teeth, subbasal teeth small, annular spine bands narrow, with sparse pilosity; 7th–9th serrulae at base as in Fig. 8.

Male unknown.

Material examined. Holotype ♀, China, Hubei, Mt. Shennongjia, Honghuaduo (31°15'N, 109°56'E; elev. 1200 m), 3 July 2007, leg. Meicai Wei. Paratypes. 1♀, China, Shaanxi, Ankang, Huoditang Forest Farm, 11 July 2010, elev. 1539 m, leg. Tao Li; 1♀, China, Hubei, Yichang, Mt. Shennongjia, Yinyuhe (31°34.005'N, 110°20.370'E; elev. 2100 m), 21 July 2011, leg. Meicai Wei and Gengyun Niu, CSCS11136. All deposited in CSCS.

Distribution. China (Shaanxi, Hubei).



Figures 1–8. *Macrophya brevicinctata* Li, Liu & Wei, sp. nov. 1. Female, dorsal view. 2. Female head, dorsal view. 3. Female head, anterior view. 4. Female antenna. 5. Female mesopleuron and metapleuron. 6. Ovipositor sheath, lateral view. 7. Lancet. 8. 7th–9th serrulae of lancet. Scale bars: 1=2 mm; 7=200 µm; 8=50 µm.

Etymology. This new specific name “*brevicinctata*” is derived from two Latin words, the “*brev-*” (short) and “*cinctus*” (circle), referring to the apex of the hind tibia with a short black ring.

Remarks. The new species is similar to *M. annulitibia* Takeuchi, 1933, but differs from the latter in having the hind tibia largely with reddish brown maculae at base, apex black, but without yellow macula; postocellar area 2 times broader than long; cell 2Rs as long as cell 1Rs, petiole of anal cell in the fore wing about 1.8 times longer than crossvein 1r-m and about 1.2 times longer than crossvein cu-a; middle serrulae of lancet in female each with 2 proximal and 9–11 distal teeth, not protruding mastoid-like. At present, the new species is the only species about the reddish brown legs. So it is easy to be distinguished by the characters with other species in *M. annulitibia*-group.

4.2 *Macrophya qinlingium* Li, Liu & Wei, sp. nov. (Figs 9–21)

Female. Body length 8.5–9.0 mm. Body black; following parts yellowish white: palpi largely, basal half of mandibles, labrum, clypeus, anterior parts of tegula, center parts of posterior margin of abdominal tergum 1, apical margin of abdominal tergum 10, apical margins of all coxae, an oval long macula on outer side of hind coxa, all trochanters, anterior sides of fore femur and tibia, basal margin of middle femur, middle ring about 3/5 times as long as hind tibia, basal 1/3 of hind femur, middle ring about 2/5 as long as hind tibia, fore and middle tarsi except for apical margins with black maculae, hind tarsomere 1 largely, hind tarsomere 2 to 4 entirely and basal half of hind tarsomere 5. Body hairs silver; short and dense; setae on sheath slightly curved, pale yellowish brown. Wings hyaline, without smoky macula, stigma and veins largely blackish brown (Fig. 9).

Dorsum of head feebly shiny, frons densely punctured slightly, not rugose, interspaces between punctures narrower than diameter of puncture, with fine microsculpture (Fig. 11); labrum and clypeus less shiny, labrum with sparse and shallow punctures; punctures on clypeus more than labrum, with some clear microsculpture (Fig. 12). Mesonotum not shiny, punctures on mesonotum smaller and denser than punctures on head, interspaces with fine microsculpture; mesoscutellum not shiny, with some shallow punctures, mesoscutellar appendage and metascutellum with distinct microsculpture, some large and shallow punctures. Mesepisternum less shiny, densely and shallowly punctured, interspaces between punctures with fine microsculpture, upper 1/2 of mesepisternum with larger punctures, lower 1/2 of mesepisternum with small punctures; anepimeron dark, rugosely punctured and wrinkled; anterior margin of katepimeron strongly shiny, without puncture or microsculpture, posterior parts of katepimeron with some shallow punctures and microsculpture; metepisternum with dense punctures and microsculpture; metepimeron less shiny, most parts with shallow and small punctures, upper corner of dorsal margin with coarse punctures; posterior margin of metepimeron extended downward, center concave, appendage containing some shallow punctures and fine microsculptures (Fig. 14). All abdominal terga feebly shiny, lateral sides of tergum 1 with some fine punctures, center nearly smooth; base of other abdominal terga with sparse and shallow punctures, microsculpture fine but distinct. Hind coxa and outer side of hind femur with minute and dense punctures, smooth interspaces narrow, feebly shiny. Surface of sheath coriaceous, with very fine punctures and microsculpture.

Middle of labrum weakly elevated, anterior margin roundish; clypeus weakly elevated, about 2 times broader than long, base broader than distance between lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin incised to approximately 2/5 length of clypeus, lateral lobes slightly acute, subtriangular-like (Fig. 12); malar space 0.6 times as long as diameter of middle ocellus; middle of frons slightly depressed, slightly higher than top of eyes in lateral view; middle fovea shallow; lateral foveae short furrow-like; interocellar furrow distinct, postocellar furrow indistinct; POL:OOL:OCL = 3.5:11:7.5; postocellar area slightly elevated, posterior margins oblique, 2 times broader than long, lateral furrows shallow and clearly divergent backwards; head strongly narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.2 times longer than head and thorax together (12:10), 0.9 times as long as abdomen (17:20); antennomere 2, 1.2 times as long as broad, antennomere 3, 1.3 times as long as antennomere 4 (21:16), 0.7 times as long as antennomeres 4 and 5 combined (21:30), subapical antennomeres weakly compressed, not inflated, subapical antennomeres 6 to 9 not reduced (Fig. 13). Mesoscutellum roundly elevated, without peak and middle carina, posterior margins without lateral carina, as high as top of mesoscutum; mesoscutellar appendage with distinct middle carina; metascutellum with low and short middle carina, mesopleuron and metapleuron as in Fig. 14; dorsal-posterior platform of mesepimeron as broad as diameter of middle ocellus; distance between cenchri 2 times breadth of cenchrus. Inner tibial spur of hind leg 0.7 times length of hind tarsomere 1 (28:42); hind tarsomere 1 slender, as long as following 4 tarsomeres together; claw with inner tooth shorter than outer tooth. Ovipositor sheath distinctly shorter than hind tarsomere 1 (31:42), apical sheath slightly longer than basal sheath (19:12), apical margin roundish in lateral view (Fig. 15). Fore wing with crossvein 1cu-a joining cell 1M at basal 2/5, crossvein 2r-rs joining cell 2Rs at apical 3/8, cell 2Rs slightly longer than cell 1Rs, crossvein Rs and 1r-m erect, crossvein 2r-m slightly oblique and curved; petiole of anal cell in fore wing about 1.8

times longer than crossvein 2r-m and about 2 times longer than crossvein 1cu-a; anal cell of hind wing without petiole. Lancet with 18 serrulae (Fig. 16), middle serrulae protruding subtriangular-like and each with 2 proximal and 6–7 distal teeth, subbasal teeth small, annular spine bands narrow, with sparse pilosity; 7th–9th serrulae at base as in Fig. 17.

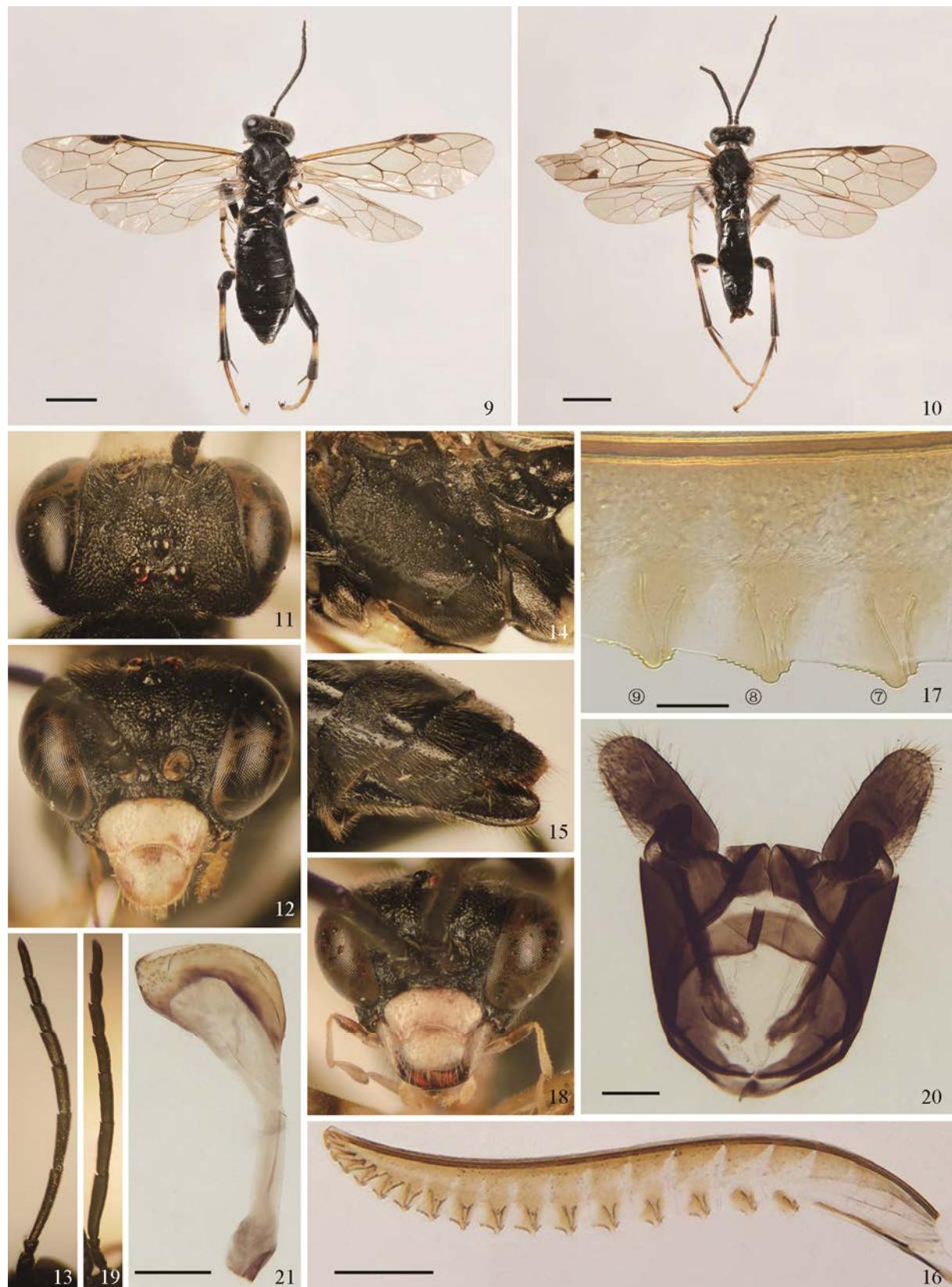
Male Body length 7.5–8.0 mm (Fig. 10), body color and structure similar to female, but lateral corners of posterior margins of pronotum yellowish white; following parts yellowish white: fore and middle coxae except for ventral sides with black maculae and basal 2/5 of hind femur; anterior view in male as shown in fig. 18; antennae in male as shown in fig. 19; subgenital palte longer than broad, center slightly elevated, apical margin roundish narrowly; inner margin on base of harpe not narrowed toward apex (Fig. 20); valvoceps of penis valve transverse, peak with a platform, without egot, penis valve as shown in fig. 21.

Variety. Length of yellowish white ring in middle of hind tibia and black maculae on base of hind tarsomere 1 more or less in female; yellowish white ring in middle of hind tibia narrowed more or less.

Material examined. Holotype ♀, China, Hubei, Mt. Shennongjia, Dalongtan (31°29'N, 110°16'E; elev. 2312 m), 31 July 2008, leg. Fu Zhao, deposited in CSCS. Paratypes. 1♀, China, Henan, Luanchuan County, 13 July 1996; 35♀2♂, China, Henan, Song County, Mt. Baiyun, elev. 1500 m, 31 May 2001, leg. Yihai Zhong; 1♀1♂, China, Henan, Mt. Baiyun, elev. 1500 m, 20 May 1999, leg. Maoling Sheng; 1♀4♂, China, Henan, Song County, Mt. Baiyun, elev. 1800 m, 2 June 2001, leg. Yihai Zhong; 4♀1♂, China, Henan, Luanchuan County, Mt. Longyuwan, elev. 1800 m, 5 June 2001, leg. Yihai Zhong; 1♀, China, Henan, Song County, Mt. Baiyun, elev. 1500 m, 18 July 2003, leg. Minwen Liang; 1♀, China, Henan, Mt. Baotianman, Protect Station (33°30'N, 111°56'E; elev. 1300 m), 23 June 2006, leg. Qing Yang; 1♀, China, Henan, Mt. Baotianman, Manding (33°30'N, 111°56'E; elev. 1854 m), 25 June 2006, leg. Yihai Zhong; 1♀, China, Henan, Luanchuan County, Mt. Longyuwan, elev. 1600 m, 29 July 2003, leg. Yingke He; 1♀, China, Sichuan, Mt. Jiuzhaigou, elev. 2500 m, 16 July 2001, leg. Meicai Wei; 1♂, China, Liaoning, Daxinggou, elev. 470 m, 17 June 2005, leg. Maoling Sheng; 1♂, China, Gansu, Tianshui City, Mt. Xiaolong, elev. 1900 m, 30 May 2005, leg. Wei Xiao; 2♂, China, Gansu, Qingshui County, Mt. Xiaolong, elev. 1360 m, 30 May 2005, leg. Maoling Sheng; 1♀, China, Gansu, Mt. Xiaolong, Tan'ge Forest Farm, Woniu (34°29'N, 104°47'E; elev. 2200–2250 m), 2 July 2009, leg. Haiyan Ma; 1♀, China, Hubei, Mt. Shennongjia, Dalongtan, elev. 2200 m, 10 June 2002, leg. Yihai Zhong; 1♀, China, Hubei, Mt. Shennongjia, Yazikou (31°31'N, 110°20'E; elev. 1241 m), 19 July 2008, leg. Fu Zhao; 3♀, China, Hubei, Mt. Shennongjia, Dalongtan (31°29'N, 110°18'E; elev. 2110 m), 1 July 2009, leg. Fu Zhao; 1♀, China, Hubei, Mt. Shennongjia, elev. 1900 m, 21 July 2003, leg. Jigang Jiang; 2♀, China, Hubei, Mt. Shennongjia, Honghuaduo (31°15'N, 109°56'E; elev. 1200 m), 3 July 2007, leg. Meicai Wei, Yihai Zhong & Wei Xiao; 1♀, China, Hubei, Mt. Shennongjia, Banbiyan, elev. 2500 m, 29 June, 2002, leg. Yihai Zhong; 1♀, China, Yunnan, Xianggelila County, Xiaozhongdian, elev. 3000 m, 18 July 2004, leg. Wei Xiao; 4♀13♂, China, Hubei, Mt. Shennongjia, 5–15 July 2010, leg. Maoling Sheng; 2♀, China, Hubei, Mt. Shennongjia, 2 August 2010, leg. Maoling Sheng; 22♂, China, Hubei, Mt. Shennongjia, 7 June 2010, leg. Maoling Sheng; 3♀, China, Ningxia, Mt. Liupan, Sutai (35°26'N, 106°11'E; elev. 2133 m), 28 June 2008, leg. Fei Liu; 1♀, China, Ningxia, Mt. Liupan, Erlonghe (35°23'N, 106°20'E; elev. 1945 m), 6 July 2008, leg. Fei Liu; 1♀2♂, China, Gansu, Linxia City, Mt. Taizi, Diaochi Forest Farm (35°14'N, 103°25'E; elev. 2500 m), 10 July 2010, leg. Zejian Li & Xiaohua Wang; 1♀, China, Hubei, Yichang City, Mt. Shennongjia, Guitouwan (31°28'N, 110°08'E; elev. 2150 m), 25–28 May 2011, leg. Zejian Li, CSCS11022; 1♀, China, Hubei, Yichang City, Mt. Shennongjia, Taiziyi (31°27'N, 110°11'E; elev. 2600 m), 20 July 2011, leg. Meicai Wei & Gengyun Niu, CSCS11128; 2♀, China, Gansu, Mt. Taizi, Diaochi Forest Farm (35°14'N, 103°25'E; elev. 2505 m), 10 July 2010, leg. Heng Xin; 1♀, China, Shaanxi, Ankang City, Lan'gao County, Mt. Daba (32°02'N, 108°50'E; elev. 2370 m), 6 July 2012, leg. Zejian Li & Mengmeng Liu, CSCS12092; 1♀, China, Shaanxi, Ankang City, Lan'gao County, Mt. Daba (32°02'N, 108°50'E; elev. 2370 m), 6 July 2012, leg. Meicai Wei & Gengyun Niu, CSCS12090; 1♀, China, Hubei, Mt. Shennongjia, Yinyuhe, Malaise #1, 20 June 2011, leg. Xiaoguang Chen; 1♀, China, Hubei, Mt. Shennongjia, Yinyuhe, Malaise #2, 20 June 2011, leg. Yuanqin Li. Above specimens are deposited in CSCS. 1♀, China, Shaanxi, Qinling Mts, Mt. Taibai, Kaitianguan (34°00'N, 107°51'E; elev. 2000 m), 1 June 2005, leg. A. Shinohara; 1♀, China, Shaanxi, Qinling Mts, Mt. Taibai, Kaitianguan (34°00'N, 107°51'E; elev. 2000 m), 6 June 2006, leg. A. Shinohara; 1♀, China, Shaanxi, Qinling Mts, Mt. Taibai, Kaitianguan (34°00'N, 107°51'E; elev. 2000 m), 10 June 2007, leg. A. Shinohara; 1♀, China, Shaanxi, Qinling Mts, Mt. Taibai, Kaitianguan (34°00'N, 107°51'E; elev. 2000 m), 31 May–2 June 2004, leg. A. Shinohara; 1♀1♂, China, Shaanxi, Qinling Mts, Mt. Taibai, Kaitianguan (34°00'N, 107°51'E; elev. 2000 m), 5–7 June 2004, leg. A. Shinohara. Above specimens are deposited in NMS.

Distribution. China (Liaoning, Ningxia, Gansu, Shaanxi, Henan, Hubei, Sichuan, Yunnan).

Etymology. This new specific name “*qinlingium*” is based on the locality of specimen collected mainly in Mts. Qinling from China.



Figures 9–21. *Macrophyia qinlingium* Li, Liu & Wei, sp. nov. 9. Female, dorsal view. 10. Male, dorsal view. 11. Female head, dorsal view. 12. Female head, anterior view. 13. Female antenna. 14. Female mesopleuron and metapleuron. 15. Ovipositor sheath, lateral view. 16. Lancet. 17. 7th–9th serrulae of lancet. 18. Male head, anterior view. 19. Male antenna. 20. Gonoforceps. 21. Penis valve. Scale bars: 9–10=2 mm; 16, 20–21=200 µm; 17=50 µm.

Remarks. The new species is similar to *M. annulitibia* Takeuchi, 1933, but differs from the latter in having postocellar area about 2 times broader than long; hind tarsomere 1 largely pale yellowish white at apex, shortly black at base. In *M. annulitibia*, the postocellar area is 2.5 times broader than long; the hind tarsomere 1 is entirely black. It is easy to be distinguished from other known species.

4.3 *Macrophya rugosifossa* Li, Liu & Wei, sp. nov. (Figs 22–32)

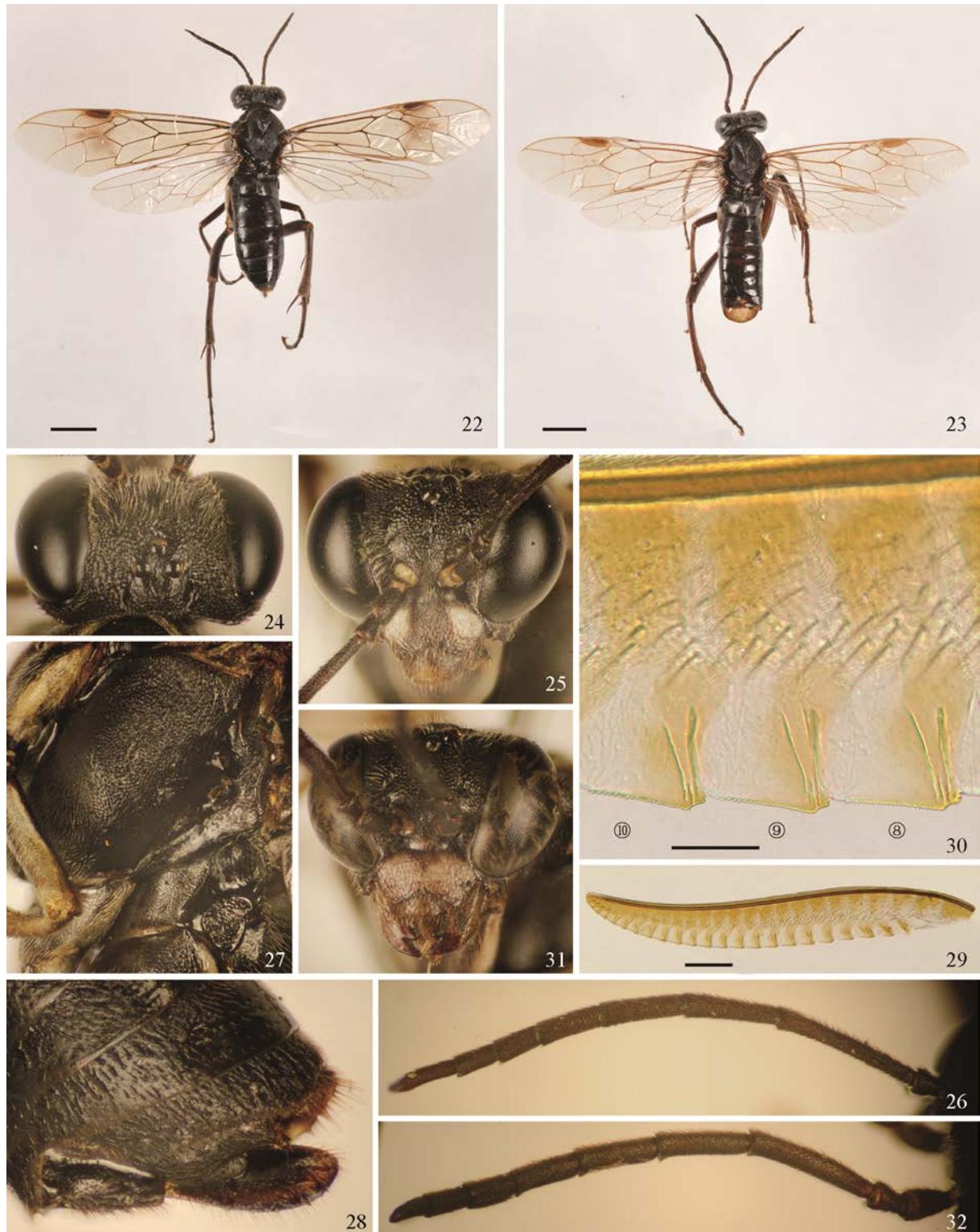
Female. Body length 10.5–11.0 mm. Body and legs black; palpi largely sordid brown; basal half of mandibles and a small triangular macula on anterior margin of labrum pale brown; following parts yellowish white: two small sub-round maculae in base of clypeus, lateral sides and posterior margin of pronotum, anterior part of tegula, center of posterior margin of abdominal tergum 1, posterior margins of terga 8 and 10, apical margins and outer sides of fore and middle coxae, apical margins and basal stripes on outer side of hind coxa; hind femur, tibia and tarsi entirely blackish brown. Body hairs silver; setae on sheath short and erect, blackish brown. Wings hyaline, with smoky macula below stigma, bound not clear; stigma and veins largely blackish brown (Fig. 22).

Dorsum of head feebly shiny, frons rugosely and densely punctured, interspaces between punctures narrower than diameter of puncture, with fine microsculpture (Fig. 24); labrum and clypeus less shiny, labrum with sparse and shallow punctures, clypeus with some large punctures and clear microsculpture (Fig. 25). Thorax feebly shiny, lateral corners of pronotum with fine microsculpture; mesonotum with punctures smaller and denser than punctures on head, interspaces with fine microsculpture; mesoscutellum not shiny, with some large punctures; mesoscutellar appendage and metascutellum less shiny, with some shallow punctures and fine microsculpture. Mesepisternum less shiny, densely and minutely punctured, interspaces with fine microsculpture; anepimeron rugosely punctured and wrinkled; anterior margin 2/5 of katepimeron strongly shiny, without puncture or microsculpture, posterior parts 3/5 of katepimeron with some shallow punctures and weak microsculpture; metepisternum with fine punctures and microsculpture; metepimeron shiny, depressed parts smooth, without puncture and microsculpture, upper corner of dorsal margin with coarse punctures; posterior margin of metepimeron extended downward and largely concave, with a basin, containing some large punctures and rugose microsculpture (Fig. 27). All abdominal terga feebly shiny, lateral sides of tergum 1 with some fine punctures, center nearly smooth; basal 2/5 of abdominal terga 2–7 with dense punctures, apical 3/5 with some punctures and fine microsculpture; terga 8–10 with dense punctures and clear microsculpture. Hind coxa and outer side of hind femur with minute and dense punctures, smooth interspaces narrow, feebly shiny. Surface of sheath coriaceous, lower half of sheath with minute punctures and fine microsculpture.

Middle of labrum weakly elevated, anterior margin truncate; clypeus weakly elevated, about 2 times broader than long, base distinctly broader than distance between lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin arc and incised to approximately 1/5 length of clypeus, lateral lobes obtuse, subangular-like (Fig. 25); malar space 0.4 times as long as diameter of middle ocellus; middle of frons flat, about as high as top of eyes in lateral view; middle fovea shallow but distinct; lateral foveae small, short furrow-like; interocellar furrow distinct, postocellar furrow indistinct; POL:OOL:OCL = 4:14:10; postocellar area weakly elevated, posterior margins oblique, 1.5 times broader than long, lateral furrows slight deep and clearly divergent backwards; head strongly narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.2 times longer than head and thorax together (6:5), as long as abdomen; antennomere 2 about 1.5 times as long as broad, antennomere 3, 1.6 times as long as antennomere 4 (30:19), 0.8 times as long as antennomeres 4 and 5 combined (5:6), subapical antennomeres weakly compressed and inflated, subapical antennomeres 6 to 9 slightly reduced (Fig. 26). Mesoscutellum roundly elevated, with peak and lateral carina in posterior margins, without distinct middle carina, distinctly higher than top of mesoscutum; mesoscutellar appendage and metascutellum with distinct middle carinae; mesopleuron and metapleuron as shown in Fig. 27; dorsal-posterior platform of mesepimeron as broad as diameter of middle ocellus; distance between cenchri 3.5 times breadth of cenchrus. Inner tibial spur of hind leg 0.6 times length of hind tarsomere 1 (18:31); hind tarsomere 1 slender, about 1.2 times longer than following 4 tarsomeres together (31:25); claw with inner tooth shorter than outer tooth. Ovipositor sheath slightly shorter than hind tarsomere 1 (23:31), apical sheath slightly longer than basal sheath (13:10), apical margin roundish narrowed in lateral view (Fig. 28). Fore wing with crossvein 1cu-a joining cell 1M at basal 1/8, crossvein 2r-rs joining cell 2Rs at apical 1/2, cell 2Rs slightly shorter than cell 1Rs; petiole of anal cell in fore wing broad puncture-like; anal cell of hind wing without petiole. Lancet with 23 serrulae (Fig. 29), middle serrulae protruding and each with 2 proximal and 22–29 distal teeth, subbasal teeth very minute, annular spine bands narrow, with sparse pilosity; 8th–10th serrulae at base as in Fig. 30.

Male Body length 10.5 mm (Fig. 23), body color and structure similar to female, but labrum largely white, anterior

view of head in male as shown in fig. 31; antennae largely dark brown, apical margins with hair ring more or less in male as shown in Fig. 32; anterior parts largely of hind femur, anterior parts of hind tibia, base on anterior parts of middle femur white; fore wing without smoky macula below stigma; subgenital palte longer than broad, center slightly elevated, apical margin roundish; genitalia unknown.



Figures 22–32. *Macrophyia rugosifossa* Li, Liu & Wei, sp. nov. 22. Female, dorsal view. 23. Male, dorsal view. 24. Female head, dorsal view. 25. Female head, anterior view. 26. Female antenna. 27. Female mesopleuron and metapleuron. 28. Ovipositor sheath, lateral view. 29. Lancet. 30. 8th–10th serrulae of lancet. 31. Male head, anterior view. 32. Male antenna. Scale bars: 22–23=2 mm; 29=200 µm; 30=50 µm.

Holotype ♀, China, Gansu, Mt. Xiaolong, Dangchuan Forest Farm, Yulingou (106°07.254'E, 34°22.179'N; elev. 1 580–1 680 m), 4 August 2009, leg. Mingjun Tang; Paratypes. 3♀1♂, China, Shaanxi, Zhouzhi County, Houzhenzi (33°50.507'N, 107°49.694'E; elev. 1 309 m), 9 July 2006, leg. Xun Zhu. All deposited in CSCS.

Distribution. China (Gansu, Shaanxi).

Etymology. The new specific name “*rugosifossa*” is derived from two Latin words, the “*rug-*” (rugose) and “*fossa*” (basin), referring to the metepimeral appendage with a large basin, containing some large punctures and rugose microsculpture clearly.

Remarks. The new species is similar to *M. pompilina* Malaise, 1945 from Burma and China (Yunnan, Sichuan), but differs from the latter by following: fore wing with feeble, transverse smoky band below stigma, bound not clear; clepeus not entirely black, base in lateral corners with small round white maculae; posterior margin of pronotum with clear white band; mesoscutellum distinctly elevated, higher than the top of mesonotum; metepimeral appendage large, with a basin, containing some large punctures and rugose microsculpture; all trochanters entirely black, without white macula; hind tarsi entirely blackish brown; middle serrulae of lancet in female usually each with 2 proximal and 22–29 distal teeth, subbasal teeth very minute. In *M. pompilina*, the following characters are in contrast: fore wing with distinct, transverse smoky band below stigma, bound clear; clepeus is entirely black; posterior margin of pronotum with narrow white band; mesoscutellum elevated slightly, as high as the top of mesonotum; metepimeral appendage is small than the former, without distinct basin, containing fine punctures and microsculpture; fore and middle trochanters is largely white, ventral sides with black maculae, hind trochanter is entirely white; hind femur is not entirely black, dorsal side 4/5 with distinct white band; hind tarsi is not entirely black, some parts with white maculae more or less; middle serrulae of lancet in female usually each with 2 proximal and 12–13 distal teeth, subbasal teeth is small.

Funding This research was supported by the High Level Talents Projects of Lishui City (2015RC06) and the Science and Technology Program funded projects of Lishui City (2014NZH03).

Acknowledgements We are thankful to Dr. Akihiko Shinohara, Department of Zoology, National Museum of Nature and Science, Japan, for collecting the type materials.

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